Operating Instructions

for

Manual Humidity Precision Measuring Unit

Model: HND-F105

1. Contents

1. Contents....2
2. Note....3
3. Instrument Inspection....3
4. Regulation Use....3
5. Operating Principle....4
6. Electrical Connection....4
7. Operation / Configuration / Adjustments....5
   - 7.1 In General....5
   - 7.2 Connections....6
   - 7.3 Display Elements....6
   - 7.4 Pushbuttons....7
   - 7.5 Device Configuration....7
   - 7.6 Some Basics Of Precision Material Moisture Measuring....9
   - 7.7 Hints For The Special Functions....12
   - 7.8 Output....13
   - 7.9 Fault and System Messages....15
   - 7.10 Inspection of the accuracy / Adjustment Services....16
8. Maintenance....16
9. Technical Information....17
10. Order Codes....18
    - 10.1 Humidity measurement probes....18
    - 10.2 Accessories....19
11. Declaration of Conformance....20

Manufactured and sold by:

Kobold Messring GmbH
Nordring 22-24
D-65719 Hofheim
Tel.: +49(0)6192-2990
Fax: +49(0)6192-23398
E-Mail: info.de@kobold.com
Internet: www.kobold.com

2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EWG-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:

- Manual Humidity Precision Measuring Unit Model: HND-F105
- Operating Instructions

4. Regulation Use

Any use of the Manual Humidity Precision Measuring Unit, model: HND-F105, which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The KOBOLD manual measuring units HND-F105 were a completely new development and offer decisive advantages in handling, user-friendliness, scope of functions, and accuracy during measuring work.

6. Electrical Connection

Mains Operation

Attention: When using a power supply unit please note that operating voltage has to be 10.5 to 12 V_{DC}. Do not apply over voltage!! Simple 12 V-power supplies often have excessive no-load voltage. We, therefore, recommend using regulated voltage power supplies. Trouble-free operation is guaranteed by our power supply HND-Z002.
Prior to connecting the plug power supply with the mains supply make sure that the operating voltage stated at the power supply is identical to the mains voltage.

- Treat device and probes carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect plugs and sockets from soiling.
- To disconnect sensor plug do not pull at the cable but at the plug.
- When connecting the probe the plug will slide in smoothly if plug is entered correctly.
- **Selection of Output-Mode**: The output can be used as serial interface or as analogue output. This choice has to be done in the configuration menu.

6.1.1 Disposal Notice

- Dispense exhausted batteries at destined gathering places.
- Send the device directly to us, if it should be disposed. We will dispose the device appropriate and non-polluting

7. Operation / Configuration / Adjustments

7.1 In General

7.1.1 Safety Instructions

This device has been designed and tested in accordance to the safety regulations for electronic devices.
However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using it.

1) Trouble-free operation and reliability of the device can only be guaranteed if it is not subjected to any other climatic conditions than those stated under *9 Technical Information*.
2) Transporting the device from a cold to a warm environment condensation may result in a failure of the function. In such a case make sure the device temperature has adjusted to the ambient temperature before trying a new start-up.
3) The circuitry has to be designed most carefully if the device should be connected to other devices. Internal connection in third party devices (e.g. connection GND and earth) may result in not-permissible voltages impairing or destroying the device or another device connected.

Warning: Operating the device with a defective mains power supply (e.g. short circuit from mains voltage to output voltage) may result in hazardous voltages at the device (e.g. at sensor socket)

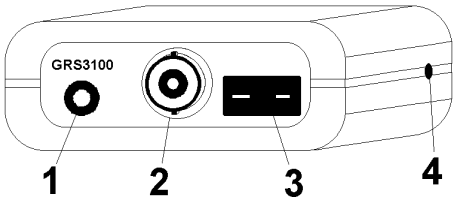
4) Whenever there may be a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting. Operator safety may be a risk if:
   - there is visible damage to the device
   - the device is not working as specified
   - the device has been stored under unsuitable conditions for a longer time

   In case of doubt, please return device to manufacturer for repair or maintenance.

Warning: Do not use these product as safety or emergency stop device, or in any other application where failure of the product could result in personal injury or material damage.
Failure to comply with these instructions could result in death or serious injury and material damage.

Risk of injury! The used measuring heads are very sharp, use thoroughly during your measuring to eliminate a possible risk of injury.

7.2 Connections

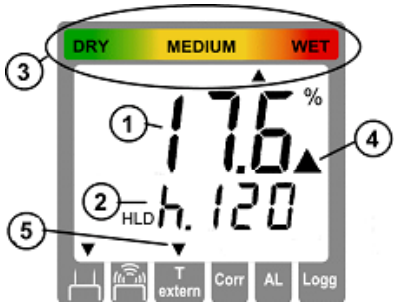


1. **Output:** Operation as interface: Connect to optically isolated interface adapter (accessory: HND-Z031) Operation as analogue output: Connection via suitable cable.

Attention: The output mode has to be configured (see chapter *7.5.7 'Out': Function of the Output*) and influences battery life!

2. **Sensor-connection:** BNC
3. **Temperature-probe-connection:** Thermocouple type K (NiCr-Ni) for temperature-compensation with an external temperature-probe
4. The **mains socket** is located at the left side of the instrument.

7.3 Display Elements



1 = Main Display: Currently measured material moisture [percent by weight]
HLD: Measure value is on hold (Button 6)

2 = Auxiliary Display: Currently selected material (or temperature when pressing Button 3)

Special display elements:

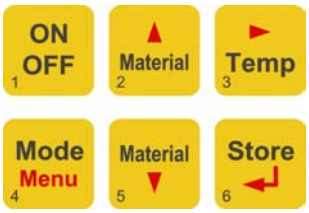
3 = Moisture estimation: Estimation of the material condition: via top arrows: DRY - MEDIUM - WET

4 = Warning triangle: Indicates low battery

5 = T external-arrow Appears if an external temperature-probe is connected and automatic temperature compensation is activated.

All remaining arrows have no function in this version.

7.4 Pushbuttons



key 1: **On/Off key**

key 4: **Set/Menu**
press (Menu) for 2 sec.: configuration will activated

key 2, 5: **During measure: select a material**
see chapter: *7.7.2 Pre-selection of favourite materials ('Sort')*
List of selectable materials:
Appendix A; Appendix B

With manual temperature compensation:
When displaying temperature (call via button 3 ‚Temp'):
Input of temperature

up/down for configuration:
to enter values or change settings

Key 6: **Store/↵**:
- Measurement:
  with Auto-Hold off: Hold current measuring value ('HLD' in display)
  with Auto-Hold on: Start a new measure, which is ready when 'HLD' appears in the display
- Set/Menu or temperature input:
  confirming of selected input, return to measure

Key 3: **During the measure:** shortly displaying temperature or changing to temperature input.

7.5 Device Configuration

For configuration of the device press "**Menu**"-key (key 4) for 2 seconds, the first menu will be shown.
Choose between the individual values that can be set by pressing the "**Menu**"-key (key 4) again.
The individual values are changed by pressing the keys "▲" (key 2) or "▼" (key 5).
Use key "**Store/↵**" (key 6) to leave configuration and to store settings.

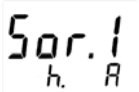
7.5.1 'Sort': limitation of the material selection

off: Unrestricted material selection via key 2 and 5

1...8: Material selection in-between 1 up to 8 selectable materials.

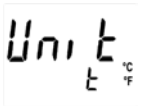
7.5.2 'Sor.X': selectable materials (not available if Sort = off)

Depending on the number that had been entered at ‚Sort' menu settings from Sor.1 up to Sor.X will be available.



Select the desired material that should be available during the measure via key 2 and 5, p.r.t: *7.7.2 Pre-selection of favourite materials ('Sort')*.

7.5.3 'Unit t': Selection of Temperature Unit °C /°F



°C: All temperature values are in degrees Celsius

°F: All temperature values are in degrees Fahrenheit

7.5.4 'ATC': Automatic temperature-compensation

oFF: Atc off: Manual input of the temperature for temperature-compensation via keys.

on: Atc on: temperature-compensation via temperature of the internal temperature measuring or with an external temperature probe.

7.5.5 'Auto-Hold': Automatically freezing the steady measure value

oFF: Auto HLD off: continuous measuring.

on: Auto-HLD on: when reaching a stable measuring result, this will be frozen with-HLD. When pressing the Store-Key a new measure will be initiated.

7.5.6 'Power.off': Selection of Power-Off Delay

1...120: Power-off delay in minutes.
Device will be automatically switched off as soon as this time has elapsed if no key is pressed/no interface communication takes place

oFF: Power-off function inactive (necessary for continuous operation, e.g. mains operation)

7.5.7 'Out': Function of the Output

OFF: No output function, lowest power consumption
SEr: Output is serial interface
dAC: Output is analogue output 0...1 V

7.5.8 'Address': Selection of Base Address when Output = Serial Interface

01, 11, 21, ..., 91: Base address of device for interface communication.

7.5.9 'dAC.0Volt': Output Offset When Output = Analogue Output

0.0...100.0 % Enter desired moisture value at which the analogue output potential should be 0 V, e.g. at 0.0 %

7.5.10 'dAC.1Volt': Output Scale When Output = Analogue Output

0.0...100.0 % Enter desired moisture value at which the analogue output potential should be 1 V e.g. at 100.0 %

Hint: The settings will be set to the settings ex works, if keys 'Set' and 'Store' are pressed simultaneously for more than 2 seconds.

7.6 Some Basics Of Precision Material Moisture Measuring

7.6.1 Material Moisture

The material moisture is a measure for the water content of a material:
material moisture = (weight wet – weight dry) / weight dry *100

7.6.2 Special features of the device

465 wood specimens and 28 building materials are stored directly in the memory of the device:
Thus more exact measurements could be reached than with common devices with group selections would ever reach. Even the usage of complex conversion tables for building materials won't be necessary any more!
Example: Common wood-moisture-measuring-devices use one single group for spruce and oak, in reality the deviation of these characteristic curves is more than 3 %! (Base for this statement are complex statistical surveys, considered measuring range 7-25 %). This random error will not occur for the whole HND-F105 series, with the help of individual characteristic curves highest resolution is achieved.
Extreme wide measuring range: 4.0-100.0 % (depending on characteristic curve) percent by weight in wood.
Moisture estimation: Additionally to the measuring value, an individual moisture estimation will be displayed simultaneously.

7.6.3 Auto-Hold Function

Particularly when measuring dry wood, electrostatic charges and other similar noise could dither the measuring value. With activated auto-hold function the device will acquire an exact measuring value automatically. During that, the device could be put down to avoid noise through discharge of the clothing etc. After having acquired the measuring value, the display will change to 'HLD': The value will be frozen as long as a new measuring is initiated by pressing button 6 (store).

7.6.4 Automatic temperature-compensation ('Atc')

An exact temperature compensation is important for a reliable wood-moisture-measuring. These devices feature a high quality thermocouple-input for type K thermocouples. Thus you could connect common surface-temperature-probes – The needed measuring-time 'afield' will be drastically lowered compared to common (non-surface-)temperature-probes. Temperature compensation is done automatically, depending on the setting and the connected probe.
The corresponding temperature will be shown shortly, by pressing the 'Temp' key.

The used temperature-value therefor is:

Menu		Used temperature-value	Aux. Display
Atc on	Temperature-probe connected	Temperature-measuring via connected external probe	Display-arrow ‘T extern‘
	No temperature-probe connected	Temperature-measuring via device-internal sensor	
Atc off	Independent from temperature-probe	Manual input of temperature: To change value, press Temp-Button, then use □ (button 2) or □ (button 5) to input the temperature confirm selection with ‘Store‘(button 6)	

Attention: When connecting a probe that is non insulated you must have to observe not touching the wood or the electrodes nearby the unshielded electrode. We suggest using our insulated probe HND-FF10 (already included in standard case sets HND-FF12 and HND-FF13).

7.6.5 Measuring In Wood: Measuring With Two Measuring-Pikes

Normally wood is measured with measuring-pikes. Used electrodes: impact-electrode HND-FF02 or HND-FF03, reciprocating piston electrode HND-FF01. For measuring wood, punch in the measuring-pikes across to the wood-grain, having a good contact between the pikes and the wood (measuring along wood-grain deviates minimal)

Reciprocating piston electrode HND-FF01 with temperature-probe HND-FF10

Select **correct wood-sort** (refer to Appendix A).
Ensure measuring the **correct temperature** (see chapter *7.6.4 Automatic temperature-compensation ('Atc')*).
Hint: The special HND-FF10 temperature-probe can be stuck into a hole punched in with the electrode before (see picture on left).Now read the measuring-value or when having activated the auto-hold-function initiate a new measuring by pressing ***Store/***↵ (button 6).
The measured resistance will be extremely high when measuring dry wood (<15 %) thus the measuring will need more time to achieve its final value. Among other things static discharge could momentarily falsify the measuring.
Therefore beware of static discharge and wait long enough until a stable measuring value is displayed (unstable: „%“ blinking) or use the auto-hold-function (see chapter *7.6.3 Auto-Hold Function*).
Most accurate measurements can be carried out within the range of **6 to 30 %**.
Beyond this range the acquirable accuracy will lessen, but the device will deliver reference values still sufficient for the practitioner.
It is measured between the measuring-pikes insulated among each other.
Requirements for an exact measurement:

- choose right correct place to measure: place should be free of irregularities like resin–clusters, knurls, rifts, etc.
- choose correct measure depth: Recommendation for trimmed timber: punch in the pikes up to 1/3 of the material thickness.

- Perform multiple measurements: the more measurements will be averaged, the more exact the result will be.
- Pay attention to temperature-compensation: the temperature-probe should be measuring the temperature of the moisture-measuring-place when measuring with external temperature-probe (Atc on).
  Without temperature-probe: let the device adapt to the temperature of the wood (Act on) or enter the exact temperature manually (Act off).

Frequent sources of errors:

- Attention with oven-dried wood: the moisture dispersion may be irregular, often in the core is more moisture than on the edge.
- Surface-moisture: The wood-edge could be more humid than the core if the wood had been stored outside and e.g. was in rain.
- Wood preservative and other treatment could falsify the measuring.
- Fouling at the connections and round the pikes could result in erroneous measurement, especially with dry wood.

7.6.6 Measuring Other Materials

7.6.6.1 'Hard' Materials (concrete or similar): Measuring with brush-type probes (HND-FF05/-FF06)

Measuring concrete with brush probe HND-F06

Drill two holes with Ø6 mm (HND-FF05) or Ø 8 mm (HND-FF06) at intervals of 8 to 10 cm into the material to be measured. Do not use edgeless drills: the resulting heat will evaporate the moisture which will result in faulty measures. Wait for at least 10 min, blow out the holes to clean them from dust. Apply conductivity compound on the brush-type probes and stick them into the holes. Choose correct material (see Appendix B: Additional materials), read the measuring value. Observe that the holes dry out by-and-by, and the device will measure a value too low, if you want to use them several times.
This effect can be compensated by using conductivity compound: insert profuse conductivity compound between the holes and the brush-type probe, and let the electrode stick in the hole for about 30 min before measuring (with the device switched off). Temperature-compensation plays no role when using the building material measuring.

7.6.6.2 'Soft' Materials (polystyrene or similar): Measuring with Measuring-pikes or -pins

Useable electrodes: impact electrode HND-FF02/-FF03, reciprocating piston electrode HND-FF01.
Procedure as described in chapter *7.6.5 Measuring In Wood*: Measuring With Two Measuring-Pikes.

7.6.6.3 Measuring bulk cargo, bales and other special measures

Usable probes e.g. injection probe HND-FF08 or measuring pins HND-FF04 mounted on HND-FF02/-FF03.

Measuring of splints, wood chips, insulating material and similar:
When using injection probes or measuring pins oscillating movements have to be avoided when pushing in the probes. Otherwise hollows between the probes and the material may falsify the measuring. The material should be sufficiently compressed. When in doubt repeat the measuring a few times: the highest measuring value is the most exact one. Especially when using the injection probe pay attention having a foulness-free plastic insulator (situated immediately underneath the measuring-pike).

Measuring bale of straw and hay bale: Always inject the electrodes form the plain side of the bale, never from the round side, the probe can be inserted much more slightly.

7.6.7 Measuring of materials, having no characteristic curves stored

Choose the representative universal material group „h.A“, „h.b“, „h.c“ und „h.d“(if a conversion table exists.

Attention: The moisture evaluation wet/dry of these material groups is only valid for wood!
Please keep in mind the following when using the temperature-compensation:
Automatic temperature-compensation should always be activated when measuring wood (Act on), with all other materials the automatic temperature-compensation should be switched off (Act off) and a manual temperature of 20 °C should be entered.

7.7 Hints For The Special Functions

7.7.1 Moisture estimation ('WET' - 'MEDIUM' - 'DRY')

Additionally to the measuring value, an individual moisture estimation will be displayed simultaneously: The decision either wet or dry has no longer be affiliated from literature and tables for the most applications. This moisture estimation is only a guidance value, the final evaluation is depending on the application of the material e.g:

Cement floor pavement ZE, ZFE without additives:
Readiness without floor heating at 2.3 % with floor heating 1.5 %
Anhydrit floor pavement AE, AFE:
Readiness without floor heating at 0.5 % with floor heating 0.3 %*
Corresponding Standards and Instructions must be observed!
The Device can only complement the skill of a tradesman or investigator but cannot replace it!

7.7.2 Pre-selection of favourite materials ('Sort')

A pre-selection of different materials (up to 8) can be selected from the menu for an effective working with the device. For example you can set the Menu Sort to 4 and save the desired materials in Sor.1, Sor.2, Sor.3 and Sor.4 if you only measure 4 different materials. Please refer to chapter *7.5.2 'Sor.X': selectable materials (not available if Sort = off)*.
Only the 4 desired materials can be selected via the buttons up and down, when exiting the menu, a changing during the measurement can be done comfortably. All materials will be available when setting Sort to off. Sor.1 to Sor.4 will still be available in the 'background', when setting the menu Sort to 4 the limited selection of the 4 entered materials will be active again. You only want to measure one material: set the menu Sort to 1 you cannot change to another material, thus a faulty operation is impossible.

7.8 Output

The output can be used as serial interface (for HND-Z031 interface adapters) or as analogue output (0-1 V). If none of both is needed, we suggest to switch the output off, because battery life then is extended.

7.8.1 Interface - Base Address ('Adr.')

By using an electrically isolated interface converter HND-Z031 (accessory) the device can be connected to a PC. In case several devices will be connected via one interface make sure to configure the base addresses accordingly. In order to avoid transmission errors, there are several security checks implemented (e.g. CRC).

The following standard software packages are available for data transfer:
BUS-SW9M: 9-channel software to record and display the measuring values

The Device has 2 Channels:

Channel 1: Material-moisture in % and base-address
Channel 2: Temperature

Note: The measuring and range values read via interface are always in the selected display unit (°C/°F)!

Supported Interface-functions:

1	2	Code	Name/Function	1	2	Code	Name/Function
x	X	0	read nominal value	x	x	202	read unit of display
x	X	3	read system status	x	x	204	read decimal point of display
x		12	read ID-no.	x		205	read extended measuring type in display
x	X	176	read min measuring range	x		208	read channel count
x	X	177	read max measuring range	x	x	214	read scale correction
x	X	178	read measuring range unit	x	x	215	set scale correction
x	X	179	read measuring range decimal point	x	x	216	read zero displacement
x	X	180	read measuring type	x	x	217	set zero displacement
	X	194	set display unit	x		222	read turn-off-delay
x	X	199	read measuring type in display	x		223	Set turn-off-delay
x	X	200	read min. display range	x		240	Reset
x	X	201	read max. display range	x		254	read program identification

7.8.2 Analogue Output – Scaling with DAC.0 and DAC.1

With the DAC.0 and DAC.1 values the output can be rapidly scaled to Your efforts.

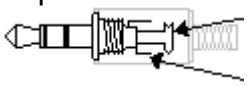
Keep in mind not to connect low-resistive loads to the output, otherwise the output value will be wrong and battery life is decreased. Loads above ca 10 kOhm are uncritical.

If the display exceeds the value set by DAC.1, then the device will apply 1 V to the output

If the display falls below the value set by DAC.0, then the device will apply 0 V to the output

In case of an error (Err.1, Err.2, no sensor, etc.) the device will apply slightly above 1 V to the output.

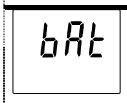
Plug wiring:



GND

Attention! The 3rd contact has to be left floating!
Only stereo plugs are allowed

7.9 Fault and System Messages

Display	Meaning	Remedy
	low battery voltage, device will continue to work for a short time	replace battery
	If mains operation: wrong voltage	replace power supply, if fault continues to exist: device damaged
	low battery voltage	replace battery
	If mains operation: wrong voltage	Check/replace power supply, if fault continues to exist: device damaged
No display or weird display Device does not react on keypress	low battery voltage	replace battery
	If mains operation: wrong voltage	Check/replace power supply, if fault continues to exist: device damaged
	system error	Disconnect battery or power supply, wait some time, re-connect
	device defective	return to manufacturer for repair
----	Sensor error: no valid signal, charge at the probe, device will discharge (resp. at dry wood)	Wait until probe has discharged
	Sensor broken or device defective	return to manufacturer for repair
Err.1	Value exceeding measuring range	Check: Is the value exceeding the measuring range specified? ->temperature too high!
	Wrong probe connected	Check probe
	Probe or device defective	return to manufacturer for repair
	Non-floating probe near the unshielded electrode	Insulate probe or measure at shielded electrode
Err.2	Value below display range	Check: Is the value below the measuring range specified? -> temperature too low!
	Wrong probe connected	Check probe
	Probe, cable or device defective	return to manufacturer for repair
Err.7	system error	return to manufacturer for repair

7.10 Inspection of the accuracy / Adjustment Services

Accuracy can be inspected with the testing adapter HND-Z058 (extra equipment). To check precision select material characteristic curve ".rEF" and plug in testing adapter.
The device must display the printed value for the HND-F105.

If the precision is no more corresponding to the imprint of the HND-Z058, we suggest to send the device to the manufacturer for a new adjustment.

8. Maintenance

Battery Operation
The battery has been used up and needs to ⚠ be replaced, if and „bAt" are shown in lower display. The device will, however, continue operating correctly for a certain time. The battery has been completely used up, if ´bAt´ is shown in the upper display. The battery has to be removed, when storing device above 50 °C.

Hint: We recommend to remove the battery if device is not used for a longer period of time! Risk of Leakage

9. Technical Information

Measuring principle:	humidity: resistive material moisture measurement in accordance with DIN EN 13183-2: 2002 temperature intern: NTC
temperature extern:	thermocouple element, NiCr-Ni (type K)
Measuring range:	humidity: 0.0 to 100 % weight moisture (depending upon the respective material characteristic curve)
temperature:	-40.0...+200.0 °C (-40.0...+392.0 °F)
Accuracy:	(at nominal temperature) wood: ±0.2 % weight moisture (deviation from the respective characteristic curve in the range 6...30 %) construct.: ±0.2 % weight moisture (deviation from the resp. char. curve) temperature (external): ±0.5 % meas. value ±0.3 °C
Temperature compensation:	manually or automatically
Resolution:	0.1 % or 0.1 °C (0.1 °F)
Display:	two 4-digit LC-displays
Permissible operating temperature:	-25 to +50 °C
Storage temperature:	-25 to +70 °C
Storage humidity:	0 to 95 % rH (non-condensing)
Probe connection:	
humidity:	BNC
temperature:	NiCr-Ni-plug that is free of thermoelectric voltage
Output:	0-1 V, freely scalable or serial interface (via 3-pin jack, transformer on RS232 or USB optional)
Power supply:	9 V-monobloc battery (included in the scope of delivery), external 10.5 -12 V_{DC} via jack
Material:	housing made of impact-resistant ABS plastic
Protection:	IP 65
front Dimensions:	142 x 71 x 26 mm (HxWxD)
Weight:	approx. 155 g

Scope of functions
Hold-function: »freezing« of the current value
Auto-hold: autom. freezing of a constant measured value
Sort: limitation of the material selection to max. 8 favorites
Automatic-off function: 1...120 min (can be deactivated)
Individual humidity evaluation: wet/moist/dry
Saved weight moisture of 494 **materials**

10. Order Codes

Order-no.	Housing design
HND-F105	For material moisture, standard

10.1 Humidity measurement probes

Order-no.	Probe type
HND-FF01	Hollow hammer electrode
HND-FF02	Impact electrode
HND-FF03	Modified impact electrode with HND-FF02-front and handle
HND-FF04	Measuring sticks 300 mm long (pair) for woodchips, excelsior, paper, etc. (for screwing onto HND-FF03)
HND-FF05	Brush probe (pair), short, for depths of up to approx. 100 mm
HND-FF06	Brush probe (pair), long, for depths of up to approx. 300 mm
HND-FF07	Roller sensor for surface measurement continuous sheets made of paper, textiles, etc.
HND-FF08	Insertion probe 1 m long with handle and 1 m connection cable (for large excelsior balls, woodchips, etc.
HND-FF09	Flat electrode (for screed, paper, etc.)
HND-FF10	Floating external NiCr-Ni-temperature probes
HND-FF11	Sensor for surface measurement of paper, textiles, etc.
HND-FF12	Wood moisture set, contents: HND-Z023 / -Z051 / -Z053 / -FF02 / -FF10
HND-FF13	Wood and construction moisture set, contents: HND-Z023 /- Z051 / -Z052 / -Z053 / -FF02 / -FF04 / -FF05 / -FF10

10.2 Accessories

Order-no.	Description
HND-Z002	Plug power supply unit (220/240 V_{AC}, 50/60 Hz), 10.5 V_{DC} / 10 mA
HND-Z015	Protective housing bag, nappa leather, with cut-out for 1 x round / 1x square sensor connection
HND-Z021*	Case with recess (275 x 229 x 83 mm)
HND-Z022*	Universal case with egg crate foam (275 x 229 x 83 mm)
HND-Z023*	Large case with recess (394 x 294 x 106 mm)
HND-Z031	Interface converter on RS232, galvanically isolated
HND-Z032	Interface converter on USB, galvanically isolated
HND-Z033	Adapter RS 232 converter on USB- interface
HND-Z034	Windows software for setting, data read-out, and printing of the data of housings of the HND- series with logger function
HND-Z051	Measuring cable (BNC on 2 x banana plugs) approx. 1 m long, for HND-F105/205
HND-Z052	100 ml conductivity paste for surface measurement and depth measurement in masonry, screed, etc. using brush probes
HND-Z053	Steel pins (3 units each 12 mm, 16 mm, and 25 mm long)
HND-Z054	Surface measuring caps (pair) for screwing onto HND-FF02/03
HND-Z055	Replacement sensor element for HND-FF11
HND-Z056	Measuring cable (2 x banana plugs, on 2 x banana plugs), length approx. 1 m, including plug adapter for HND-F110 (not for HND-FF08 and HND-FF10)
HND-Z057	Replacement measuring pins (10 units) for HND-F110
HND-Z058	Testing adapter
HND-Z061	Replacement spring head for HND-FF32
HND-Z063	Replacement spring head for HND-FF33

*observe instrument dimensions

11. Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Manual Humidity Precision Measuring Unit Model: HND-F105

to which this declaration relates is in conformity with the standards noted below:

EN 61326+A1+A2

Also the following EEC guidelines are fulfilled:

2004/108/EG,92/31/EWG,93/68/EWG	Electromagnetic Compatibility Directive
73/23/EWG, 93/68/EWG	Low Voltage Directive

Hofheim, 01. April 2006

H. Peters
General Manager

M. Wenzel
Proxy Holder

Appendix A: Sorts of wood

Select kind of wood you want to measure, enter number on the device, e.g. birch = h. 60

Identification	Number	Comment	Range
Group A	h. A	Wood-group A	0..82%
Group B	h. B	Wood-group B	1..95%
Group C	h. C	Wood-group C	2..107%
Group D	h. D	Wood-group D	3..121%
AS/NZS 1080.1	h. AS	Australian reference characteristic curve	4..91%
Group Spruce-Pine-Fir	h.402	Softwood-Group	6..99%
Fir, Picea abies Karst.	**h.460**	**applications in the glued timber construction, MPA certified**	**6..101%**
HND-F reference	.rEF	Internal reference for determining additional characteristic curves / calculation tables (without temperature-compensation)	

Abura	Hallea ciliata	h.2	7..50%
Afrormosia	Pericopsis elata	h.3	6..47%
Afzelia	Afzelia spp.	h.4	8..42%
Agba	Gossweilerodendron balsamiferum	h.426	6..64%
Albizia / Iatandza, New Guinea	Albizia falcatara	h.8	5..88%
Albizia / Iatandza, Solomon Island	Albizia falcatara	h.9	4..72%
Alder, Blush	Solanea australis	h.10	5..65%
Alder, Brown	Caldcluvia paniculosa	h.11	7..69%
Alder, Common	Alnus glutinosa	h.131	2..107%
Alder, Rose	Caldcluvia australiensis	h.12	6..71%
Alerce	Fitzroya cupressoides	h.13	7..61%
Amberoi	Pterocymbium beccarii	h.14	5..67%
Amoora, New Guinea	Amoora cucullata	h.15	3..94%
Andiroba	Carapa guianensis	h.16	5..59%
Antiaris, New Guinea	Antiaris toxicaria	h.7	6..83%
Apple, Black	Planachonella australis	h.17	7..62%
Ash Silvertop	Eucalyptus sieberi	h.27	2..90%
Ash, American	Fraxinus americana	h.132	5..79%
Ash, Bennet's	Flindersia bennettiana	h.18	6..76%
Ash, Crow's	Flindersia australis	h.19	7..69%
Ash, European	Fraxinus excelsior	h.133	7..56%
Ash, Hickory	Flindersia ifflaiana	h.20	6..71%
Ash, Japanese	Fraxinus mandshurica	h.134	4..79%
Ash, Red	Flindersia excelsa	h.21	5..67%
Ash, Scaly	Ganophyllum falcatum	h.22	5..90%
Ash, Silver (Northern)	Flindersia schottina	h.23	7..70%
Ash, Silver (Queensland)	Flindersia bourjotiana	h.24	6..88%
Ash, Silver (Southern)	Flindersia schottina	h.25	7..82%
Ash, Silver, New Guinea	Flindersia amboinensis	h.26	5..82%
Aspen, Hard	Acronychia laevis	h.28	5..66%
Ayan	Distemonanthus benthamianus	h.285	7..54%
Balau	Shorea laevis	h.31	4..54%
Balau, red	Shorea guiso	h.32	4..68%
Balsa	Ochroma pyramidale	h.33	4..91%
Basralocus / Angelique	Dicorynia guianensis	h.34	6..55%
Basswood	Tilia americana	h.228	4..85%
Basswood, Fijian	Endospermum macrophyllum	h.35	4..63%
Basswood, Malaysian	Endospermum malacense	h.36	5..116%
Basswood, New Guinea	Endospermum medullosum	h.37	5..76%
Basswood, Silver	Polyscias elegans	h.38	7..72%
Basswood, Solomon Island	Polyscias elegans	h.39	4..65%
Bean, Black	Castanosperum australe	h.40	6..87%
beech, damped	Fagus sylvatica	h.87	6..55%
beech, european -	Fagus sylvatica	h.86	5..85%
Beech, Myrtle	Nothofagus cunninghamii	h.41	6..76%
Beech, New Zeeland Red (hearted untreated)	Nothofagus fusca	h.42	7..87%
Beech, New Zeeland Red (sapwood boron)	Nothofagus fusca	h.43	2..97%
Beech, New Zeeland Red (sapwood untreated)	Nothofagus fusca	h.44	5..84%
Beech, Silky	Citronella moorei	h.45	8..66%
Beech, Silver	Nothofagus menziesii	h.46	8..58%
Beech, Silver (sapwood tanalith)	Nothofagus menziesii	h.47	6..76%
Beech, Silver (sapwood untreated)	Nothofagus menziesii	h.48	4..92%
Beech, Wau	Elmerrilla papuana	h.49	7..96%
Beech, White (Fiji)	Gmelina vitiensis	h.50	5..77%
Beech, White (Queensland)	Gmelina leichardtii	h.51	6..81%
Bintangor / Calophyllum, Fijian	Calophyllum leucocarpum	h.53	5..81%
Bintangor / Calophyllum, Malaysian	Calophyllum curtisii	h.54	6..76%
Bintangor / Calophyllum, New Guinea	Calophyllum papuanum	h.55	4..98%
Bintangor / Calophyllum, Phillipines	Calophyllum inophyllum	h.56	6..78%
Bintangor / Calophyllum, Solomon Islands	Calophyllum kajewskii	h.57	6..85%
Binuang	Octomeles sumatrana	h.130	5..73%
Birch, American	Betula lutea	h.59	7..72%
Birch, European	Betula pubescens	h.60	5..96%
Birch, White	Schizomeria ovata	h.58	7..75%
Bishop Wood (Fiji)	Bischofia javanica	h.61	5..73%
Blackbutt	Eucalyptus pilularis	h.62	4..92%
Blackbutt, Western Australia	Eucalyptus patens	h.63	6..88%
Blackwood	Acacia melanoxylon	h.64	6..75%
Bloodwood, Red	Corymbia gunmifera	h.66	7..78%
Bollywood	Litsea reticulata	h.67	5..78%
Bossime	Drypetes spp,	h.70	7..62%
Box Grey	Eucalyptus moluccana	h.75	8..73%
Box Grey Coast	Eucalyptus bosistoana	h.76	7..76%

Box, Black	Eucalyptus lafgiflorens	h.71	5..92%
Box, Brush (Location Unknown)	Lophostemon confertus	h.74	5..53%
Box, Brush (N.S.W.)	Lophostemon confertus	h.72	4..55%
Box, Brush (Queensland	Lophostemon confertus	h.73	7..46%
Box, Kanuka	Tristania laurina	h.77	6..78%
Boxwood, New Guinea	Xanthophyllum papuanum	h.78	5..69%
Boxwood, Yellow	Planchonella pholmaniana	h.79	7..62%
Brachychiton	Brachychiton carrthersii	h.80	5..55%
Bridelia	Bridelia minutiflora	h.81	5..103%
Brigalow	Acacia harpohylla	h.82	5..83%
Brownbarrel	Eucalyptus fastigata	h.83	5..80%
Bubinga	Guibourtia demeusii	h.84	7..70%
Buchanania	Buchanania arborescens	h.85	4..76%
Burckella, Solomon Island	Burckella obovata	h.88	4..59%
Butternut, Rose	Blepharocarya involucrigera	h.89	5..69%
Camphorwood, New Guinea	Cinnamomum spp,	h.90	6..74%
Campnosperma (Malaysia)	Campnosperma curtisii	h.91	8..95%
Campnosperma (Solomon Island)	Campnosperma kajewskii	h.92	3..78%
Cananga (Phillipines)	Canagium odoratum	h.93	7..62%
Canarium Solomon Island	Canarium salomonese	h.97	4..65%
Canarium, African	Canarium Scheinfurthii	h.94	7..80%
Canarium, Fijian	Canarium oleosum	h.95	5..77%
Canarium, New Guinea	Canarium vitiense	h.96	5..75%
Candlenut	Aleurites moluccana	h.98	0..168%
Carabeen, Yellow	Sloanea woollsii	h.99	6..67%
Cathormion, New Guinea	Cathormion umbellatum	h.100	4..56%
Cedar , Amercan	Cedrela odorata	h.102	8..67%
Cedar, incense	Calocedrus decurrens	h.65	5..96%
Cedar, White	Melia azedarach	h.101	7..86%
Cedar, Yellow	Chamaecyparsis nootkatensis	h.457	4..91%
Celtis, New Guinea	Celtis spp,	h.103	5..67%
Celtis, Solomon Island	Celtis philippinesis	h.104	4..56%
Cheesewood, White (Queensland) /Asian Alstonia	Alstonia scholaris	h.105	5..77%
Chengal (Malaysia)	Neobalanocarpus heimii	h.106	4..76%
Cherry, American	Prunus serotina	h.216	5..97%
Cherry, European	Prunus avium	h.217	7..68%
Cleistocalyx	Cleistocalyx mirtoides	h.107	5..85%
Coachwood	Ceratopetalum apetalum	h.108	4..84%
Coondoo, Blush	Planchonella laurifolia	h.109	6..60%
Cordia, New Guinea	Cordia dichotoma	h.110	5..51%
Corkwood, Grey	Erythrina vespertillio	h.111	6..57%
Courbaril	Hymenaea coubaril	h.112	7..53%
Cudgerie, Brown	Canarium australasicum	h.113	7..67%
Cupiuba	Goupia glabra	h.147	6..56%
Curupixá	Micropholis	h.114	6..52%
Cypress	Cupressus spp,	h.456	5..89%
Cypress, Northern	Callitris intratropica	h.115	6..78%
Cypress, Rottnest Island	Callitris preisii	h.116	7..80%
Cypress, White	Callitris glaucophylla	h.117	6..86%
Dakua, Salusalu (Fiji)	Decussocarpus vitiensis	h.118	6..83%
Dibetou/African walnut	Lovoa trichilioides	h.119	7..68%
Dillenia (Solomon Island)	Dillenia salomonese	h.120	4..65%
Doi (Fiji)	Alphitonia zizphoides	h.121	5..72%
Duabanga, New Guinea	Duabanga moluccana	h.124	4..72%
Ebony, african	Diospyros spp,	h.125	6..55%
Ekki	Lophira alata	h.29	4..73%
Elm, European	Ulmus spp,	h.374	7..51%
Elm, White	Ulmus americana	h.373	5..69%
Evodia, White	Melicope micrococca	h.135	5..60%
Figwood (Moreton Bay)	Ficus macrophylla	h.139	7..56%
Fir, alpine	Abies lasiocarpa	h.410	6..80%
Fir, amabilis	Abies amabilis	h.411	4..91%
Fir, Douglas	Pseudotsuga menziesii	h.122	5..91%
Fir, Douglas (New Zealand) (sapwood treated)	Pseudotsuga menziesii	h.140	6..73%
Fir, Douglas (New Zealand) (sapwood untreated)	Pseudotsuga menziesii	h.141	5..108%
Fir, Douglas (New Zealand) (truewood untreated)	Pseudotsuga menziesii	h.142	3..99%
Fir, grand	Abies grandis	h.412	4..91%
Fir, Spruce	Abies magnifica	h.413	5..97%
Fir, white / Fir, silver	Abies alba	h.414	5..93%
Fir, MPA	**Picea abies Karst.**	**h.460**	**6..101%**
Galip	Canarium indicum	h.143	5..64%
Garo-Garo	Matrixiodendron pschyclados	h.144	5..67%
Garuga	Garuga floribunda	h.145	6..53%
Goncalo Alvez	Astronium spp,	h.146	6..45%
Greenheart	Ocotea rodiaei	h.148	6..100%
Greenheart, Queensland	Endiandra compressa	h.149	7..82%
Guarea, black	Guarea cedrata	h.68	7..94%
Guarea, white	Guarea cedrata	h.69	9..67%
Guariuba	Clarisia racemosa	h.150	8..57%
Gum, Black	Nyssa sylvatica	h.162	7..76%
Gum, Blue, Sidney	Eucalyptus saligna	h.152	7..76%
Gum, Blue, Southern	Eucalyptus globulus	h.151	6..79%
Gum, Grey	Eucalyptus punctata	h.153	5..89%
Gum, Grey, Mountain	Eucalyptus cypellocarpa	h.154	6..79%
Gum, Maiden's	Eucalyptus maidenii	h.155	7..79%
Gum, Manna	Eucalyptus viminalis	h.156	4..80%
Gum, Mountain	Eucalyptus dalrympleana	h.157	3..89%
Gum, Pink	Eucalyptus fasciculosa	h.158	6..85%
Gum, Red, American	Liquidambar styraciflua	h.166	5..92%
Gum, Red, Forest	Eucalyptus tereticomis	h.159	7..82%
Gum, Red, River	Eucalyptus camaldulensis	h.160	7..94%
Gum, Rose / Gum, Saligna	Eucalyptus grandis	h.161	7..81%
Gum, Shining	Eucalyptus nitens	h.163	5..83%
Gum, Spotted (Victoria) (Lemon-Scented)	Corymbia spp,	h.164	4..72%
Gum, Sugar	Eucalyptus cladocalyx	h.165	6..79%
Gum, White Dunn's	Eucalyptus dunnii	h.167	4..72%
Gum, Yellow	Eucalyptus leucoxylon	h.168	7..73%

Handlewood, Grey	Aphanante phillipinensis	h.169	5..66%
Handlewood, White	Strebulus pendulinus	h.170	7..58%
Hardwood, Johnstone River	Bakhousia bancroftii	h.171	5..62%
Hemlock / Hemlock, Western	Tsuga heterophylla	h.172	8..54%
Hemlock, Chinesische	Tsuga chinensis	h.173	5..75%
Hevea	Hevea Brasiliensis	h.174	7..71%
Hickory	Carya spp.	h.175	6..69%
Hollywood, Yellow	Premna lignum-vitae	h.176	7..67%
Horizontal	Anodopetalum biglandulosum	h.177	7..84%
Incensewood	Pseudocarapa nitidula	h.178	8..58%
Iroko	Chlorophora excesla	h.179	7..46%
Ironbark, Grey	Eucalyptus drephanophylla	h.180	7..88%
Ironbark, Grey	Eucalyptus paniculata	h.181	5..86%
Ironbark, Red	Eucalyptus sideroxylon	h.182	8..79%
Ironbark, Red, Broad Leaved	Eucalyptus fibrosa	h.183	8..81%
Ironbark, Red, Narrow Leaved	Eucalyptus cerbra	h.184	5..86%
Jarrah	Eucalyptus marginata	h.185	5..92%
Jelutong	Dyera costulata	h.186	0..104%
Jequitibá	Cariniana spp,	h.187	5..64%
Kahikatea (New Zealand) (Boron)	Dacrycarpus docrydiodies	h.188	7..63%
Kahikatea (New Zealand) (Thanalith)	Dacrycarpus docrydiodies	h.189	6..73%
Kahikatea (New Zealand) (untreated)	Dacrycarpus docrydiodies	h.190	6..74%
Kamarere (Fiji)	Eucalyptus deglupta	h.191	5..66%
Kamarere (New Guinea)	Eucalyptus deglupta	h.192	5..83%
Kapur	Dryobalanops spp,	h.193	7..73%
Karri	Eucalyptus diversicolor	h.194	5..79%
Kauceti	Kermadecia vitiensis	h.200	4..57%
Kauri	Agathis australis, boroneensis	h.201	5..78%
Keledang	Artocarpus lanceifolius	h.202	0..132%
Kempas	Koomapassia excelsa	h.203	4..89%
Keranji (Malaysia)	Dialium platysepalum	h.204	5..51%
Keruing	Dipterocarpus spp,	h.205	6..64%
Kiso	Chisocheton schumannii	h.218	6..54%
Lacewood, Yellow	Polyalthia oblongifolia	h.219	5..68%
Laran	Anthocephalus chinensis	h.223	7..67%
Larch	Larix decidua	h.221	5..69%
Larch, American / Larch, Western	Larix occidentalis	h.220	5..98%
Larch, Japanese	Larix kaempferi	h.222	5..99%
Lauan, Red	Shorea negrosensis	h.224	5..62%
Leatherwood	Eucryphia lucida	h.225	6..79%
Lightwood	Acacia implexa	h.226	7..62%
Limba	Terminalia superba	h.227	6..56%
Lime, European	Tilia vulgaris	h.229	4..78%
Louro, Red	Ocotea rubra	h.231	5..76%
Macadamia	Floyda praealta	h.232	7..59%
Magnolia	Magnolia acuminata/grandiflora	h.233	6..88%
Mahogany, Brush	Geissos benthamii	h.242	7..57%
Mahogany, Miva	Dysoxylum muelleri	h.243	8..73%
Mahogany, New Guinea	Dysoxylum spp,	h.241	6..74%
Mahogany, Red	Eucalyptus botryoides	h.244	7..91%
Mahogany, Rose	Dysoxylum fraseranum	h.245	7..65%
Mahogany, Southern	Eucalyptus botryoides	h.246	5..82%
Mahogany, White	Eucalyptus acmenoides	h.247	6..93%
Mahogony Khaya	Khaya spp,	h.235	7..82%
Mahogony, American	Swietenia spp,	h.234	6..84%
Mahogony, Phillipines	Parashorea plicata	h.236	5..93%
Mahogony, Phillipines	Shorea almon	h.237	4..67%
Mahogony, Sapelli / Sapele	Entandrophragma cylindricum	h.238	5..99%
Mahogony, Sipo / Utile	Entradrophragma utilie	h.239	6..110%
Mahogony, Tiama / gedu nohor	Entadrophragma angolense	h.240	10..54%
Mako	Trischospermum richii	h.248	3..68%
Makoré	Thieghemmella africana	h.123	6..86%
Makorè	Thieghemella heckelii	h.249	7..80%
Malas	Homalium foetidum	h.250	5..72%
Malletwood	Rhodamnia argentea	h.251	5..68%
Malletwood, Brown	Rhodamnia rubescens	h.252	5..70%
Manggachapui	Hopea acuminata	h.253	6..87%
Mango	Mangifera minor	h.254	4..68%
Mango, Phillipines	Mangifera altissima	h.255	7..93%
Mangosteen (Fiji)	Garcinia myrtifolia	h.256	5..68%
Mangrove, Cedar	Xylocarpus australasicus	h.257	6..82%
Maniltoa (Fiji)	Maniltoa grandiflora	h.258	6..58%
Maniltoa (New Guinea)	Maniltoa pimenteliana	h.259	6..58%
Mansonia	Mansonia altissima	h.260	7..80%
Maple, New Guinea	Flindersia pimentelianan	h.261	6..87%
Maple, Queensland	Flindersia brayleyana	h.262	5..136%
Maple, Rose	Cryptocarya erythroxylon	h.263	6..64%
Maple, Scented	Flindersia laevicarpa	h.264	7..57%
Mararie	Pseudoweinwannia lanchanocarpa	h.265	8..75%
Marri	Eucalyptus calophylla	h.266	5..64%
Masiratu	Degeneria vitiensis	h.267	5..67%
Massandaruba	Manilkara kanosiensis	h.268	4..65%
Matai	Podocarpus spicatus	h.269	6..73%
Mengkulang	Heritiera spp,	h.270	5..67%
Meranti, Buik from 1999	Shorea platiclados	h.271	4..61%
Meranti, Dark Red	Shorea spp,	h.272	5..94%
Meranti, Nemesu from 1999	Shorea pauciflora	h.274	4..91%
Meranti, Seraya from 1999	Shura curtisii	h.275	5..62%
Meranti, Tembaga from 1999	Shorea leprosula	h.276	3..72%
Meranti, White	Shorea hypochra	h.277	4..94%
Meranti, Yellow	Shorea multiflora	h.273	0..111%
Merawan	Hopea sulcala	h.278	4..90%
Merbau	Intsia spp,	h.279	6..84%
Mersawa	Anisoptera laevis	h.280	4..96%
Messmate	Eucalyptus obliqua	h.281	8..75%
Moabi	Baillonella toxisperma	h.282	6..83%
Mora	Mora excelsa	h.283	5..59%
Moustiqaire	Cryptocarya spp,	h.284	4..77%
Musizi	Maesopsis eminii	h.286	7..94%
Neuburgia	Neuburgia collina	h.287	7..75%
Nutmeg (Fiji)	Myrstica spp,	h.290	5..74%

Nutmeg (New Guinea)	Myrstica buchneriana	h.291	5..78%
Nyatoh	Palaquium spp,	h.292	4..71%
Oak, European	Quercus robur L.,	h.126	4..87%
Oak, Japanese	Quercus spp,	h.127	4..91%
Oak, New Guinea	Castanopsis acuminatissima	h.293	4..90%
Oak, Red	Quercus spp,	h.128	5..91%
Oak, Silky, Fishtail	Neorites kevediana	h.294	3..59%
Oak, Silky, Northern	Cardwellia sublimia	h.295	5..83%
Oak, Silky, Red	Stenocarpus salignus	h.296	6..67%
Oak, Silky, Southern	Grevillea robusta	h.297	5..64%
Oak, Silky, White	Stenocarpus sinuatus	h.298	6..64%
Oak, Tasmanian	Eucalyptus regnans	h.299	7..87%
Oak, Tulip, Blush	Argyrodendron actinophyllum	h.300	6..60%
Oak, Tulip, Brown	Argyrodendron trifoliolatum	h.301	9..60%
Oak, Tulip, Red	Argyrodendron peralatum	h.302	9..87%
Oak, Tulip, White	Petrygota horsfieldii	h.303	5..69%
Oak, White-	Quercus spp,	h.129	5..81%
Obah	Eugenia spp,	h.304	5..66%
Obeche	Triplochiton scleroxylon	h.1	5..50%
Odoko	Scottellila coriancea	h.305	6..72%
Olive	Olea hochstetteri	h.306	7..80%
Olivillo	Atextoxicon puncttatum	h.307	5..70%
Opepe	Nauclea diderrichii	h.52	7..73%
Padauk, African	Pterocarpus soyauxii	h.308	4..79%
Palachonella, Fijian	Planchonella vitiensis	h.347	6..61%
Palachonella, New Guinea	Planchonella kaernbachiana	h.348	4..71%
Palachonella, New Guinea	Planchonella thyrsoidea	h.349	2..67%
Palachonella, Solomon Island	Planchonia papuana	h.350	4..57%
Paldao	Dracontomelum dao	h.309	4..86%
Panga Panga	Millettia stuhlmannii	h.312	6..45%
Papuacedrus	Papuacedrus papuana	h.314	6..88%
Parinari, Fijian	Oarinari insularum	h.315	4..78%
Penarahan	Myristica iners	h.316	6..94%
Peppermint, Broad-Leaved	Eucalyptus dives	h.317	6..94%
Peppermint, Narrow-Leaved	Eucalyptus australiana	h.318	8..76%
Peroba, White	Paratecoma peroba	h.319	7..60%
Persimmon	Diospyros pentamera	h.320	5..70%
Perupok (Malaysia)	Kokoona spp,	h.321	1..135%
Perupok (Malaysia)	Lophopetalum subovatum	h.322	8..98%
Pillarwood	Cassipourea malosano	h.323	4..79%
Pine / Pine, Stone	Pinus pinea	h.345	6..87%
Pine, Aleppo	Pinus halepensis	h.324	8..76%
Pine, Austrian	Pinus nigra	h.212	5..106%
Pine, Beneguet	Pinus kesya	h.325	8..104%
Pine, Black	Prumnoptys amarus	h.326	5..76%
Pine, Bunya	Pinus bidwillii	h.327	8..69%
Pine, Canary Island	Pinus canariensis	h.328	6..80%
Pine, Celery-Top	Phyllocladus aspenifolius	h.329	7..71%
Pine, Hoop	Araucaria cunninghamii	h.330	7..79%
Pine, Huon	Dacrydium franklinii	h.331	8..70%
Pine, King William	Athrotaxis selaginoides	h.332	7..67%
Pine, Klinki	Araucaria hunsteinii	h.333	4..91%
Pine, Loblolly-	Pinus taeda	h.209	5..91%
Pine, Longpole-	Pinus contorta	h.207	5..96%
Pine, Maritime	Pinus pinaster	h.334	8..74%
Pine, Parana Red	Araucaria angustifolia	h.335	6..39%
Pine, Parana White	Araucaria angustifolia	h.336	7..58%
Pine, Pitch-, american	Pinus palustris	h.211	6..65%
Pine, Pitch-, caribbean	Pinus caribaea	h.210	6..93%
Pine, Radiata	Pinus radiata	h.337	5..100%
Pine, Radiata (New Zealand) (sapwood aac)	Pinus radiata	h.338	7..78%
Pine, Radiata (New Zealand) (sapwood boliden)	Pinus radiata	h.339	6..85%
Pine, Radiata (New Zealand) (sapwood boron)	Pinus radiata	h.340	6..69%
Pine, Radiata (New Zealand) (sapwood tanalith)	Pinus radiata	h.341	5..73%
Pine, Radiata (New Zealand) (sapwoodt untreated)	Pinus radiata	h.342	5..91%
Pine, Red	Pinus resinosa	h.343	2..99%
Pine, Scotts	Pinus sylvestris L.	h.206	6..94%
Pine, Shortleaf	Pinus echinata	h.213	5..96%
Pine, Slash (Queensland)	Pinus elliottii	h.344	6..86%
Pine, Southern	Pinus echinata	h.214	5..97%
Pine, Southern, yellow / Pine, Ponderosa	Pinus ponderosa	h.208	5..96%
Pine, Sugar	Pinus lambertiana	h.215	4..97%
Pine, western white	Pinus monticola	h.406	5..98%
Pittosporum (Tasmania)	Pittosporum bicolor	h.346	4..82%
Planchonia	Pleiogynium timorense	h.351	5..73%
Pleiogynium / Podo	Podocarpus neriifolia	h.352	7..57%
Podocarp, Fijian	Decussocarpus vitiensis	h.353	6..79%
Podocarp, Red	Euroschinus falcata	h.354	6..83%
Poplar, Black	Populus nigra	h.313	4..91%
Poplar, Pink	Euroschinus falcata	h.355	6..67%
Quandong, Brown	Eurocarpus coorangooloo	h.356	5..75%
Quandong, Silver	Elaecarpus angustifolius	h.357	5..65%
Quandong, Solomon Island	Elaecarpus spaericus	h.358	3..67%
Qumu	Acacia Richii	h.359	5..67%
Raintree (Fiji)	Samanea saman	h.360	5..49%
Ramin	Gonystylus spp,	h.361	6..54%
Redwood / Sequoia	Sequoia sempervirens	h.362	5..88%
Rengas	Gluta spp,	h.363	4..85%
Resak (Malaysia)	Cotylelobium melanoxylon	h.364	3..94%
Rimu (non-truewood boron)	Dacrydium cupresinum	h.365	7..65%
Rimu (non-truewood tanalith)	Dacrydium cupresinum	h.366	7..65%
Rimu (non-truewood untreated)	Dacrydium cupresinum	h.367	8..69%
Rimu (truewood untreated)	Dacrydium cupresinum	h.368	8..44%
Robinia	Robinia pseudoacacia	h.369	2..72%
Roble Pellin	Nothofagus obliqua	h.370	6..72%

Rock maple	Acer saccharum	h.6	5..92%
Rosewood, Brasilian	Dalbergia nigra	h.311	5..58%
Rosewood, Indian	Dalbergia latifolia	h.310	4..91%
Rosewood, New Guinea	Pterocarpus indicus	h.371	5..66%
Rosewood, Phillippines	Pterocarpus indicus	h.372	10..54%
Sapupira	Hymenolobium excelsum	h.375	5..68%
Sasauria (Fiji)	Dysoxylum quercifolium	h.376	4..69%
Sassafras	Doryphora sassafras	h.377	6..70%
Sassafras, Southern	Atherospherma moschatum	h.378	7..66%
Satinash, Blush	Acmena Hemilampra	h.379	3..84%
Satinash, Grey	Syzygium gustavioides	h.380	5..82%
Satinash, New Guinea	Syzygium butterneranum	h.381	5..68%
Satinash, Rose	Syzygium francisii	h.382	5..59%
Satinay	Syncarpia hilii	h.383	4..92%
Satinbox	Phenbalium saquameum	h.384	5..92%
Satinheart, Green	Geijera salicifolia	h.385	8..51%
Satinwood, Tulip	Rhodosphaera rhodanthema	h.386	6..94%
Scentbark	Eucalyptus aromapholia	h.387	5..70%
Schizomeria, New Guinea	Schizomeria serrata	h.388	5..81%
Schizomeria, Solomon Island	Schizomeria serrata	h.389	4..60%
Sepetir	Sindora coriaceae	h.390	1..88%
Sheoak, Fijian Beach	Casuarina nodiflora	h.391	6..71%
Sheoak, River	Casuarina cunninghamiana	h.392	7..59%
Sheoak, Rose	Casuarina torulosa	h.393	8..58%
Sheoak, Western Australia	Allocasuarina fraserana	h.394	7..64%
Silkwood, Bolly	Cryptocarya ablata	h.395	8..53%
Silkwood, Silver	Flindersia acuminata	h.396	7..71%
Simpoh (Phillippines)	Dillenia philippinensis	h.397	5..86%
Sirus, White	Ailainthus peekelii	h.398	5..74%
Sirus, White	Ailainthus triphysa	h.399	7..70%
Sloanea	Sloanea spp,	h.400	5..77%
Spondias	Spondias mariana	h.401	4..72%
Spruce, European	Picea abies Karst.	h.136	6..101%
Spruce, Norway /Norway Spruce	Picea abies	h.137	6..105%
Spruce, Sitka	Picea sitchensis	h.138	5..98%
Sterculia, Brown	Sterculia spp,	h.230	4..91%
Stringybark, Brown	Eucalyptus capitellata	h.403	6..83%
Stringybark, Darwin	Eucalyptus tetrodonta	h.404	5..81%
Stringybark, Yellow	Eucalyptus muelleriana	h.405	9..77%
Suren	Toona cilata	h.407	6..103%
Sweet chestnut	Castanea sativa	h.199	2..107%
Sycamore	Acer pseudoplatanus	h.5	7..57%
Sycamore, Satin	Ceratopetalum succirubrum	h.408	7..63%
Tallowwood	Eucalyptus microcorsis	h.409	4..92%
Tatajuba	Bagassa guianesis	h.30	7..44%
Taun Maleisien	Pometia pinnata	h.195	0..105%
Taun New Guinea	Pometia pinnata	h.196	6..103%
Taun Phillipines	Pometia pinnata	h.197	7..99%
Taun Solomon Island	Pometia pinnata	h.198	4..70%
Tawa	Beilschmiedia tawa	h.415	8..51%
Tawa (sap & heart boron)	Beilschmiedia tawa	h.416	6..61%
Tawa (sap & heart untreated)	Beilschmiedia tawa	h.417	7..64%
Teak	Tectona grandis	h.418	6..80%
Terap	Artocarpus elasticus	h.419	2..169%
Terentang	Campnosperma brevipetiolata	h.420	5..77%
Terminalia Braun	Terminalia microcarpa	h.421	3..71%
Terminalia Gelb	Terminalia complanata	h.422	3..87%
Tetrameles	Tetrameles nudiflora	h.423	5..70%
Tingle, Red	Eucalyptus jacksonii	h.424	5..110%
Tingle, Yellow	Eucalyptus guilfolei	h.425	5..105%
Tornillo	Cedrelinga catenaeformis	h.427	5..71%
Totara	Podocarpus totara	h.428	7..63%
Touriga, Red	Calophyllum constatum	h.429	8..73%
Tristiropsis, New Guinea	Tristiropsis canarioides	h.430	6..70%
Tulipwood	Harpullia pendula	h.432	7..76%
Turat	Eucalyptus gomophocephala	h.431	7..71%
Turpentine	Syncarpia glomulifera	h.433	5..91%
Vaivai-Ni-Veikau	Serianthes myriadenia	h.434	5..61%
Vatica, Phillippines	Vatica, manggachopi	h.435	7..63%
Vitex, New Guinea	Vitex cofassus	h.436	5..78%
Vuga	Metrosideros collina	h.437	6..56%
Vutu	Barringtonia edulis	h.438	4..55%
Walnut, American	Juglans nigra	h.288	5..87%
Walnut, Blush	Beilschmiedia obtusifolia	h.439	8..64%
Walnut, European	Junglans regia	h.289	7..59%
Walnut, Queensland	Endiandra palmerstonii	h.440	6..101%
Walnut, Rose	Endiandra muelleri	h.441	3..78%
Walnut, White	Cryptocarya obovota	h.442	7..63%
Walnut, Yellow	Beilschmiedia bancroftii	h.443	5..66%
Wandoo	Eucalyptus wandoo	h.444	7..87%
Wattle, Hickory	Acacia penninervis	h.445	7..64%
Wattle, Silver	Acacia dealbata	h.446	7..73%
Wengé	Millettia laurentii	h.448	7..55%
Western Red Cedar	Thuja plicata	h.449	6..56%
Whitewood, American	Liriodendron tulipifera	h.447	5..99%
Woolybutt	Eucalyptus longifolia	h.450	7..80%
Yaka	Dacrydium nausoriensis/nidilum	h.451	6..69%
Yasi-Yasi I (Fiji)	Syzygium effusum	h.452	4..71%
Yasi-Yasi II (Fiji)	Syzygium spp,	h.453	5..82%
Yate	Eucalyptus cornuta	h.454	6..73%
Yertschuk	Eucalyptus considenia	h.455	7..88%

Appendix B: Additional materials

Select material you want to measure, enter number on the device, e.g. concrete b25 = b. 6

Measuring of building materials

Material	Number	Range	Moisture estimation
Concrete			
Concrete 200kg/m³ B15 (200 kg Concrete per 1m³ sand)	b. 5	0,7..3,3%	yes
Concrete 350kg/m³ B25 (350 kg Concrete per 1m³ sand)	b. 6	1,1..3,9%	yes
Concrete 500kg/m³ B35 (500 kg Concrete per 1m³ sand)	b. 7	1,4..3,7%	yes
gas-aerated concrete (Hebel)	b. 9	1,6..173,3%	yes
gas-aerated concrete (Ytong PPW4, gross density 0,55)	b. 27	1,6..53,6%	yes
Screed			
Anhydrit screed AE, AFE	b. 1	0,0..30,3%	yes
Ardurapid screed-concrete	b. 2	0,6..3,4%	no
Elastizell screed	b. 8	1,0..24,5%	yes
Screed-plaster	b. 11	0,4..9,4%	yes
Wood-concrete screed	b. 13	5,3..20,0%	yes
Screed-concrete ZE, ZFE without additives	b. 21	0,8..4,6%	yes
Screed-concrete ZE, ZFE with bitumen additives	b. 22	2,8..5,5%	yes
Screed-concrete ZE, ZFE with synthetic additives	b. 23	2,4..11,8%	yes
Miscellaneous			
Asbestos cement panels	b. 3	4,7..34,9%	no
Bricks clay bricks	b. 4	0,0..40,4%	no
Plaster	b. 10	0,3..77,7%	yes
Plaster synthetic	b. 12	18,2..60,8%	yes
On-wall plaster	b. 20	0,0..38,8%	no
Lime mortar KM 1:3	b. 14	0,4..40,4%	yes
Lime sand bricks (14 DF (200), gross density 1,9)	b. 28	0,1..12,5%	yes
Limestone	b. 15	0,4..29,5%	yes
MDF	b. 16	3,3..52,1%	yes
Cardboard	b. 17	9,8..136,7%	yes
Stone-timber	b. 18	10,5..18,3%	yes
Polystyrene	b. 25	3,9..50,3%	yes
soft-fibre-panel-wood, bitumen	b. 26	0,0..71,1%	yes
Concrete mortar ZM 1:3	b. 19	1,0..10,6%	yes
Concrete bounded fake boards	b. 24	3,3..33,2%	yes

The accuracy of measuring building materials depends on manufacturing and using. The used additives may vary from manufacturer to manufacturer, therefore deviating measure results may occur. The given measuring-range is the theoretically measurable range.

Estimation of additional materials

Following materials may be well estimated with the help of the device, but you won't reach such high accuracy than with materials listed in appendix A and B.

Material	Number	Comment
Hay, flax	h. 458	Injection probe HND-Z058
Straw, grain	h. 459	Injection probe HND-Z058
Cork	h. A	
Fibre board	h. C	
Wood fibre insulating wall panel	h. C	
Wood fibre hard disks	h. C	
Kauramin-fake boards	h. C	
Melamine-fake boards	h. A	
Paper	h. C	
Phenolic resin-fake boards	h. A	
Textiles	h. C (D)	